ENVIRONMENTAL CLEANUP OFFICE
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION 10

HIGHLIGHTS OF THE SOIL REMEDIAL ACTION

NORTHWEST PIPE & CASING / HALL PROCESS COMPANY

CLACKAMAS, OREGON

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INTRODUCTION

This report describes major aspects of the soil remedial action (RA) conducted at the Northwest Pipe and Casing / Hall Process Company (NWPC) site. EPA contractors performed the remedial action during the late summer and fall of 2001. These remedial activities implemented the Record of Decision (ROD) for the Soil Operable Unit (OU), issued by EPA in June 2000. The soil remedy selected by EPA in the ROD provided for a phased approach – Phase 1 consists of soil hot spot removal and Phase 2 is a clean soil cap. The 2001 remedial action covered only Phase 1. A detailed description of the 2001 Phase 1 remedial activities completed is contained in *The Remedial Action Report for Northwest Pipe and Casing Site* dated April 2002.

SITE BACKGROUND

The NWPC site is located between SE Lawnfield and SE Mather Roads in Clackamas County, Oregon (**Figure 1**). The CERCLIS ID number for this site is ORD 980988307. Beginning in 1956, Hall Process Company owned and operated a pipe-coating facility at the 32-acre site. Immediately to the north, Northwest Pipe and Casing owned and operated a pipe manufacturing facility. In 1978, Hall ceased operating and then leased the pipe-coating facility to NWPC, which continued active pipe coating until 1985 when NWPC declared bankruptcy. Pipe coating operations involved sandblasting pipe with steel shot, spraying the pipes with primer, and applying coating material. Coal tar, coal tar epoxy, asphalt, polyethylene epoxy, and concrete were used as coating materials.

Historical on-site disposal and mishandling of wastes from the pipe manufacturing and pipe coating operations resulted in the contamination of site soils with polynuclear aromatic hydrocarbons (PAHs), PCBs, and volatile organic compounds (VOCs). Contaminants were present extensively across the site and in both surface and subsurface soils. Coal tar used for coating pipes was the main source of PAH contamination of the soils. Chlorinated solvents, mainly tetrachloroethene (PCE), were used in the maintenance and cleaning of pipe-coating equipment and are the likely source of VOC contamination of soil. PCE and its breakdown products, trichloroethene (TCE) and vinyl chloride, are also present in site groundwater. Polychlorinated biphenyls (PCBs) were used in cutting oils, hydraulic oils, cooling oils, and / or electrical transformers. PCB-containing waste oils may have been used for on-site dust suppression based on their widespread detection in shallow soils.

The site was placed on the Superfund National Priorities List on October 14, 1992. The site has been vacant since 1985. Removal actions conducted by EPA include perimeter security fencing, demolition of unused metal-fabricated buildings, removal of two underground fuel storage tanks and removal of approximately 230 tons of surface debris -- coal tar chunks, metal bins containing solidified coal tar, and abandoned car tires and batteries. Security patrols have been conducted since 1999 to discourage trespassing.

In 1997 and 1998, EPA and the State of Oregon reached settlements with several responsible parties associated with the site. These settlements included some funds paid to EPA and the State to be used for cleanup actions. The settlement agreement with Mr. Hall also transferred ownership of a portion of the property, approximately 32 acres in size, to DEQ, as trustee for EPA and DEQ.

SCOPE OF THE SOIL REMEDIAL ACTION

RECORD OF DECISION

In June 2000 the U.S. Environmental Protection Agency (EPA) issued the Record of Decision (ROD) for the cleanup of soil contamination at the site.

The soil remedy includes the following components:

- Removal or on-site reuse of site structures and subsurface features, such as soil piles, concrete foundations, above-ground tanks and buried piping.
- Excavation and removal of soil with concentrations of PAHs, PCBs and VOCs exceeding 'Hot Spot' threshold levels established in the ROD.
- Either off-site disposal in a permitted landfill or off-site thermal treatment of excavated soil, depending on the concentrations of the PCBs and PAHs.
- On-site pre-treatment of soils with high concentrations of PCE, TCE or vinyl chloride, prior to off-site treatment or disposal.
- Backfilling excavations with either clean soil or thermally treated soil returned to the site.
- Placing a two-foot thick cap of clean soil over the site (in Phase 2).
- Obtaining institutional controls to limit and manage human exposure to contaminated soil remaining underneath the cap (in Phase 2).

(In September 2001, EPA issued a ROD for OU 2 – Groundwater. Remedial action for groundwater will proceed on a schedule separate from the soil cleanup.)

SOIL EXCAVATION CRITERIA

The ROD established contaminant 'hot spot' threshold concentrations for identifying soil targeted for excavation and removal from the site. The design documents termed these concentrations 'Excavation Criteria' (EC), shown below in **Table 1.**

Table 1
Excavation Criteria

Contaminant	Concentration μg/kg[1]
Benzo(a)anthracene	250,000
Benzo(b)fluoranthene	250,000
Benzo(k)fluoranthene	250,000
Benzo(a)pyrene	25,000
Chrysene	25,000,000
Dibenz(a,h)anthracene	25,000
Indeno(1,2,3-cd)pyrene	250,000
Total PCBs	20,000
Tetrachloroethene (PCE)	39
Trichloroethene (TCE)	40
Vinyl Chloride	9

Notes: [1] µg/kg - micrograms per kilogram

The ROD estimated a total volume of 32,600 cubic yards (CY) of soil, in seven distinct areas of the site, exceeded the EC and would need to be excavated. Of this amount, approximately 4,000 cy of soil was estimated to have PCB concentrations greater than 50 mg/kg, thus requiring disposal in a landfill compliant with the Toxic Substances Control Act. The remaining 28,000 CY of excavated soil was to be thermally treated off-site and then returned to the site as backfill. Several existing piles of soil on the site were expected to be clean enough to also be used for backfill.

SOIL BACKFILL CRITERIA

The ROD also established maximum contaminant concentrations for soil used to backfill the excavated areas. These maximum limits, based on the risk assessment and shown below in **Table 2**, are generally 100 times lower for the PAHs and approximately one order of magnitude lower for the PCBs and VOCs than the respective excavation criteria.

Table 2
Maximum Contaminant Levels in Backfilled Soil

Contaminant	Concentration **μg/kg**[1]
Benzo(a)anthracene	2,500
Benzo(b)fluoranthene	2,500
Benzo(k)fluoranthene	2,500
Benzo(a)pyrene	250
Chrysene	250,000
Dibenz(a,h)anthracene	250
Indeno(1,2,3-cd)pyrene	2,500
Total PCBs	1,000
Tetrachloroethene (PCE)	7
Trichloroethene (TCE)	13
Vinyl Chloride	0.1[2]

Notes: [1] μg/kg - micrograms per kilogram, or parts per billion
[2] EPA raised the maximum concentration to 1.0 during design, based on requirements of the standard analytical method.

REMEDIAL DESIGN AND RA PROCUREMENT

URS Corporation, EPA's Remedial Design Contractor, completed the design of the soil remedy Phase 1 in mid-2001. The following design documents were prepared:

- *Analytical Quality Assurance Project Plan and Sampling and Analysis Plan*
- *Post-RI Fieldwork Summary Report*
- *Project Specifications, Plans, and Subcontract Documents for Remediation and Demolition*
- *Site Health and Safety Plan for Remedial Action*
- *Construction Quality Assurance Plan*

The design included further site characterization to refine the soil excavation boundaries and overall soil volume estimates. This additional site characterization resulted in lowering the estimated quantities of soil exceeding the EC to 16,000 CY from the ROD estimate of 32,000 CY.

RA PROCUREMENT

EPA issued the RA work assignment to URS following design completion. URS used a two-step bidding process to procure the primary RA subcontract. Step 1 consisted of inviting offerors to submit a technical qualifications proposal without any pricing information. In Step 2, offerors whose proposals were deemed acceptable by URS were then asked to submit a bid with pricing to perform the work. The basis for the RA subcontract award was on the lowest responsive and responsible bid price based on overall project price.

REMEDIAL ACTION CONTRACTORS

EPA was the lead agency for the Phase 1 Soil RA. The Oregon Department of Environmental Quality (DEQ) was the support agency.

- The EPA used the following prime contractor for conduct of the RA:

  URS Corporation
  Remedial Action Contract No. 68-W98-228
  Work Assignment No. 084-RA-RA-10G8

- The bulk of the RA construction activities were performed by URS' subcontractor:

  Remtech
  Tacoma, WA

- The soil thermal treatment subcontractor was:

  TPS Technologies, Inc.
  Portland, OR

- The landfill which received non-hazardous solid waste was:

  Waste Management, Inc.
  Hillsboro, OR

- The landfill which received TSCA-regulated PCB soil and debris was:

  Waste Management, Inc.
  Arlington, OR

In addition, several analytical laboratories, including a facility under EPA's Contract Laboratory Program (CLP), were used on behalf of URS and TPS Technologies to analyze soil, water and air samples taken during the RA.

OVERVIEW OF THE SOIL REMEDIAL ACTION

SOIL HANDLING OPERATIONS

The bulk of the RA work consisted of excavating, screening, stockpiling, and offsite treatment or disposal of soils from the seven EAs (**Figure 2**). Soil remediation consisted of the following steps:

- Excavation of soils expected to have contaminant concentrations above the EC.
- Screening of excavated soils using a 2-inch mesh mechanical screen. Screening of soil was necessary because the thermal treatment facility could not process material greater than 2-inch particle size (“oversized material”).
- Placement of screened soil and oversize material into separate stockpiles up to 100 yd^3 in size on plastic-lined areas of the site.
- Collection and laboratory analysis of composite soil samples from each stockpile to determine its disposition.
- Backfilling, off-site thermal treatment, or off-site disposal of the screened soil or oversize material depending on the results of the stockpile sample analytical data.
  - Screened soil and inert oversized material with no EC exceedances was used as backfill.
  - Screened soil with EC exceedances, but with total PCBs less than 50 mg/kg, was thermally treated and returned to the site for use as backfill.
  - Screened soil and oversized material with total PCBs greater than 50 mg/kg, was disposed at a TSCA/RCRA Subtitle C landfill. Oversized material with EC exceedances, but with total PCBs less than 50 mg/kg, was disposed at a RCRA Subtitle D landfill.
- Following removal of all soils with anticipated EC exceedances, confirmation soil samples were collected from the sidewall and bottom of each EA. Additional soil excavation was typically conducted at confirmation sample locations with EC exceedances. Excavated soils resulting from these “overexcavations” were subjected to the same process described above.
- Each EA was backfilled using thermally treated soil, excavated soils with no EC exceedances, or soil from pre-existing soil piles at the site. Excavations were backfilled to generally match the existing grade, followed by compaction testing and application of hydroseed.

SOIL QUANTITIES

Figure 3 below shows the amount of soil excavated based on disposition. A total of 32,010 tons (or approximately 21,340 CY) of soil was excavated during the RA.

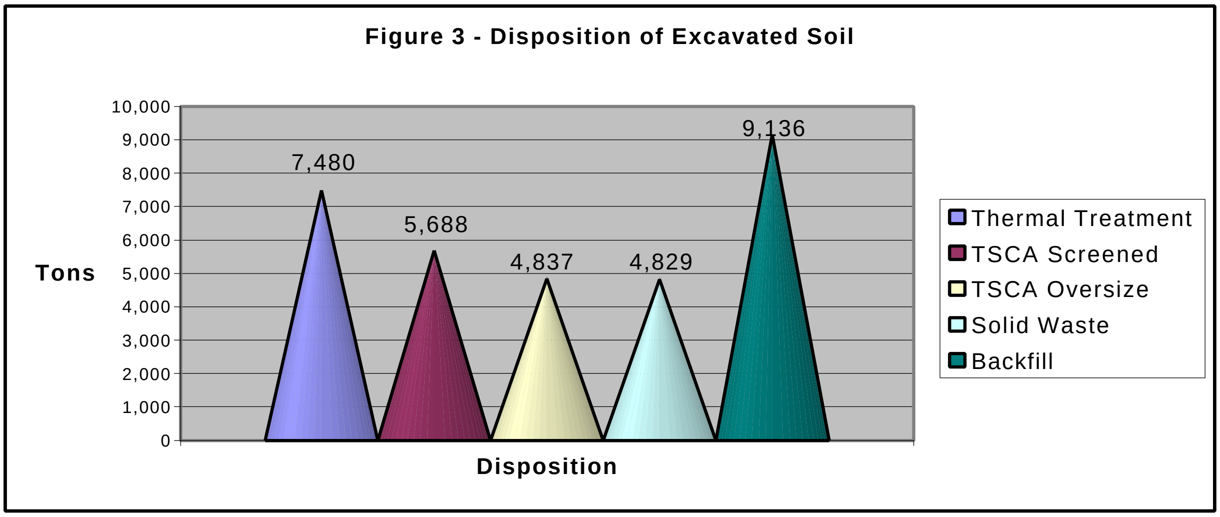
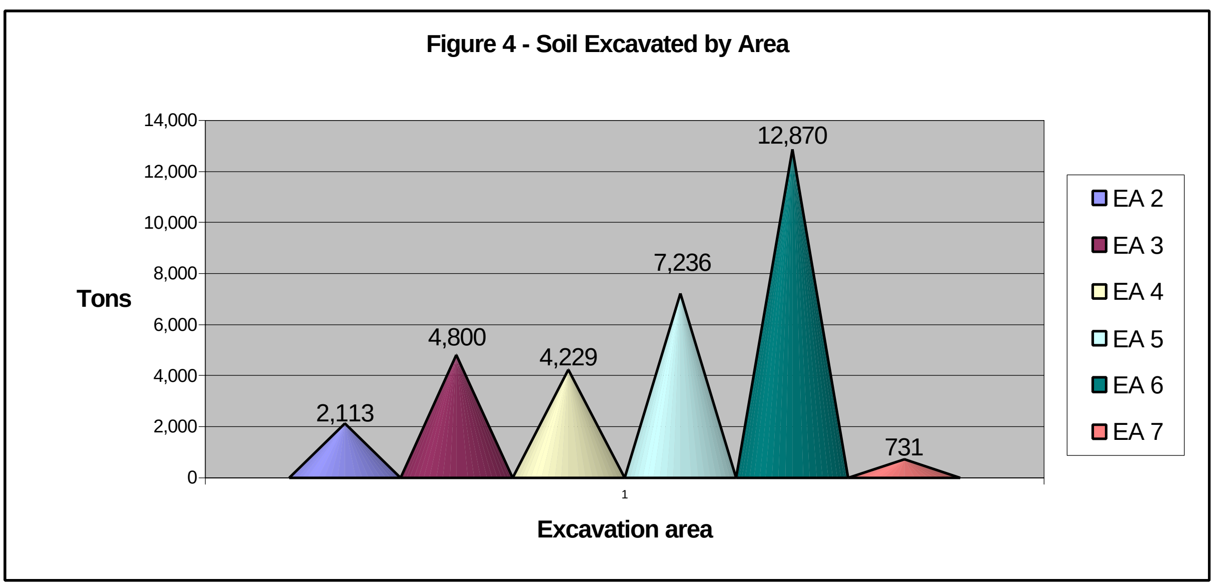


Figure 4 below shows the amount of soil excavated from each area.



OTHER ACTIVITIES

Numerous additional activities. not directly related to soil excavation at each of the EAs, were conducted during the RA. These activities include the following:

- Vegetation removal/site clearing to facilitate various RA activities;
- Erosion/sediment control and dust suppression;
- Demolition, on-site crushing and reuse of various concrete footings, foundations, and slabs;
- Off-site disposal of an above-ground 5,000 gallon tank containing solidified coal tar;
- Removal and off-site disposal of 380 railroad ties from a former on-site railroad siding;
- Off-site recycling of two metal bins;
- Removal of six vertical in-ground drains;
- Management of 114 55-gallon drums containing investigative-derived waste (soil) generated during the RI/FS. The soil was sampled during the RA, determined to have no exceedances of the EC, and used as backfill;
- Transport of pre-existing soil piles to excavation areas for use as backfill; the soil piles were generated during previous demolition and development activities on the site and adjacent properties; sampling of the piles during the RI/FS indicated that they did not contain exceedances of the EC for site COCs;
- Removal of two perforated buried underground metal structures (similar to tanks) discovered during the RA;
- Excavation and off-site disposal of 50 buried drums containing oily liquid/sludge, discovered in EA 2 during the RA
- On-site treatment and disposal of water pumped from an in-ground structure at EA 3;
- Collection and off-site disposal of miscellaneous surface debris and trash;
- Off-site disposal of a tire ash pile;
- Chain-link fence construction to complete the site perimeter fence;
- Hydroseeding of areas disturbed during the RA.

HEALTH AND SAFETY

Health and Safety (H&S) procedures were conducted at the site in accordance with the site-specific Health and Safety Plan (HASP). H&S activities included a pre-construction H&S meeting, daily H&S meetings, an audit of URS and Remtech H&S procedures, and air monitoring.

AIR MONITORING

Air monitoring was conduced during the weeks of August 13 and August 27 in accordance with the procedures and action levels prescribed in the Air Monitoring Plan. The following activities were conducted:

- Monitoring of total dust concentrations immediately downwind of active work areas and at the site boundary;
- Collection of dust samples immediately downwind of active work areas for analysis of site COCs to ensure compliance with COC-specific action levels and adequate protection of on-site workers and the public;
- Monitoring of organic vapors using a photoionization detector (PID).

Results of the dust monitoring indicated good control of off-site dust migration. All Time Weighted Averages for the sampling periods indicated virtually non-detectable amounts of dust, well below the 10-part per million (ppm) on-site action level and 3-ppm site boundary action level.

A PID was used to monitor organic vapor concentrations during drum removal at EA 2, and during excavation of test pits downgradient of the underground metal structure at EA 3. PID readings downwind of both areas occasionally exceeded the 10-ppm action level, and maximum concentrations as high as 1,000 ppm were recorded. However, these concentrations were typically instantaneous, and quickly dropped to below the action level after a few seconds. The established health and safety criteria required that the action level be exceeded for a 5-minute duration before an air-purifying respirator was required.

FUNDING AND COSTS

INCREMENTAL FUNDING

Late in the design, EPA determined that $2.1 million in funding would be available for the RA, which was significantly less than the $3.1 million estimated cost for the full Phase 1 soil RA. As a result of the limited funding, EPA directed URS to split the RA bidding documents into two segments referred to as Segment 1 and Segment 2. The scope of Segment 1 included only those RA activities that could be completed within the $2.1 million funding limit. Segment 2 included all other work necessary to complete the Phase 1 RA.

Segmenting the RA allowed at least some RA work to be done with the existing funds, while preserving the option to perform more RA work if additional funding became available. Within six weeks after the RA fieldwork started, EPA secured additional funds, bringing the RA funding to $3.125 million, and authorized URS to perform Segment 2 work.

RA COST TRACKING

On a daily and weekly basis, URS tracked the actual cost of the RA, and updated the project cost estimate (Estimate to Complete [ETC]) on a weekly basis. The ETC included actual costs and projected costs. The ETC fluctuated on a weekly basis, but generally its value was known with sufficient confidence to permit EPA to authorize URS to complete all RA activities originally identified during design. Also, the ETC remained below the funding limit, with the difference being identified as the "contingency" or "reserve."

During the RA, differing site conditions were encountered that required various actions. URS developed cost estimates to address these conditions. The contractual structure of the RA was specifically designed so that any activities associated with management of changed conditions would not be considered out of scope. That is, with EPA technical and contract management support, both the subcontract with Remtech and the RAC workplan were developed with sufficient flexibility to meet the project needs. This flexibility, in concert with the weekly ETC completed by URS, permitted EPA to approve the completion of additional tasks for which the costs were below the value of the contingency. EPA issued Technical Direction Letters approving additional tasks. URS then authorized Remtech, via Change Orders and Directives, to complete the additional tasks.

FINAL COSTS

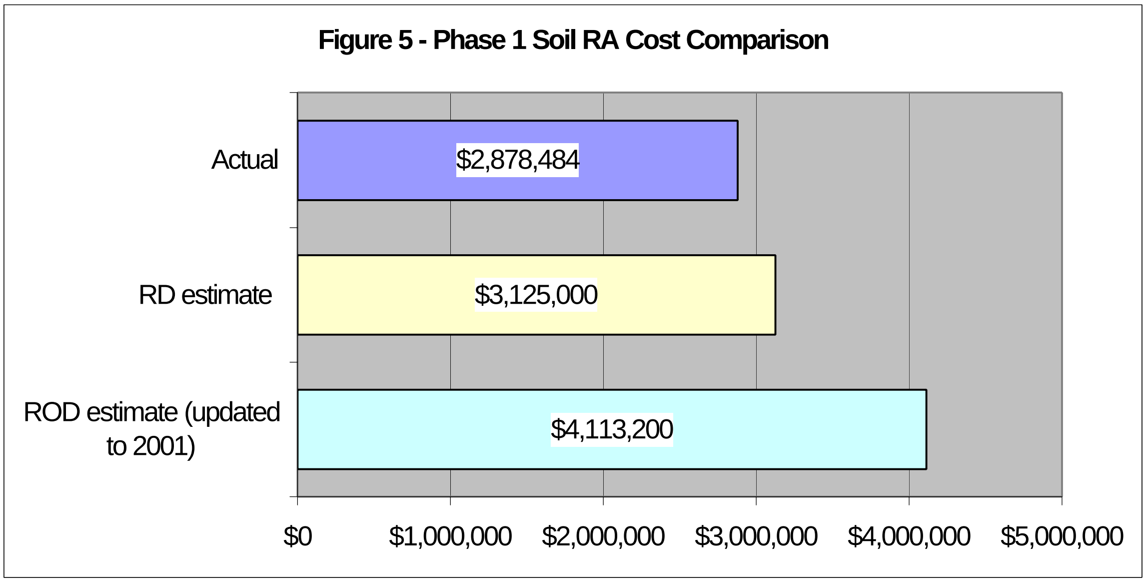
The final cost of the RA was $2,878,484, excluding minor remaining costs associated with reporting, on-going site security, and final grading (to be completed in spring 2002). The RA costs are summarized in **Table 4.**

Table 4
Remedial Action Costs

Item	Cost
URS labor	338,702
Subcontracts	
Remtech	2,381,936
Surveying	18,986
Analytical labs[1]	102,258
Concrete crushing	15,225
All remaining costs	21,377
Total	**$2,878,484**

[1] Excludes laboratory services performed by EPA and CLP labs.

Figure 5 below compares actual and estimated RA construction costs. More work was actually performed during the RA than identified in the ROD, due to unforeseen field conditions encountered.



PROJECT SUCCESSES

This section highlights several of the important successes of the project. The multitude of nuances associated with the project frequently demonstrated the importance of a well-planned and implemented remedial project, and the necessity for contractual and procedural flexibility to accommodate unanticipated or changed conditions occurring during the RA.

WASTE TRACKING DATABASE

During design, URS developed the Waste Tracking Database (WTD) to manage the significant amount of data that would be generated during the RA. Data associated with the excavated soil included soil pile designations, soil pile and confirmation sample IDs, soil pile and confirmation sample analytical data, soil pile disposition (both the anticipated disposition at the time of excavation and the final disposition based on analytical data), soil pile weight (both the anticipated weight at the time of excavation, and the final weight once soil piles cross the scales at the disposal or treatment facility), shipping manifests, disposal certifications, and costs associated with management of the soil. Over 245,500 data fields were generated and managed on a real-time basis over the short duration (several months) construction period. On a daily basis, decisions were made based on these data that had significant cost ramifications on the project. The WTD facilitated rapid, accurate, and cost-effective decision making, and provided a level of accuracy to the weekly ETC that would not otherwise have been possible. On a daily basis, questions were asked of the database manager that could be answered accurately within minutes, via access to the WTD.

COST TRACKING DATABASE

The cost-tracking database (CTD) was developed to track all URS labor costs, subcontractor costs, and other direct costs. A project administrator was assigned to the project, whose responsibility was to incorporate these costs into the database. The WTD and CTD combined resulted in the ability of the RA Project Manager, Construction Manager, and the EPA Work Assignment Manager (WAM) to have access to accurate cost information on a daily basis.

FLEXIBLE CONTRACT STRUCTURE

The flexible contract structure of the project played a significant role in the success of the RA. During the remedial design, a concerted effort was made to understand all significant aspects of the project having cost and schedule implications. Nevertheless, based on past experiences, the team members understood that it is rarely possible to anticipate every condition that might be encountered during the implementation of an RA, and that the discovery of new conditions was likely. The contractual structure of the RA was specifically designed so that, within pre-established limits, activities associated with management of changed conditions would not be considered out of scope. Thus, the EPA WAM was able to authorize URS to conduct work associated with changed conditions without delays, which would otherwise occur from repeatedly modifying the scope of the RA contract.

ADHERENCE TO HEALTH AND SAFETY PROCEDURES

A project-specific Health and Safety Plan was developed to protect on-site workers and off-site business employees from exposure to hazardous materials that might be encountered during implementation of the RA. Health and safety procedures were communicated to all URS and subcontractor personnel at the beginning of the project, and to new subcontractor personnel as they were assigned to the project. Also, URS required that Remtech conduct daily health and safety briefings, covering the health and safety concerns associated with the work to be completed during that day with their personnel. Approximately twice a month, URS held a health and safety meeting for all URS and subcontractor personnel. Health and safety concerns were also discussed during the weekly meeting between URS, EPA, and Remtech. Finally, a URS health and safety professional conducted an audit of the project early during the RA.

As a result of the diligent adherence to health and safety procedures, only a single, minor health and safety incident occurred during the RA. The incident involved a truck driver for the trucking company hired by Remtech to transport soils off site. In the process of cutting plastic sheeting to cover the soil in the truck, the truck driver cut his thumb, and required four stitches.

REUSE AND RECYCLING OF MATERIALS

Several materials encountered during the RA were able to be reused on-site or recycled, including the following:

- 1,600 cubic yards of concrete rubble produced from demolition of concrete slabs and foundations were crushed and reused on-site to backfill excavations.
- 7,480 tons of thermally treated soil was returned to the site for backfilling excavations.
- 10,000 gallons of contaminated groundwater removed from an underground structure were treated on-site and reused for dust suppression.
- Woody vegetation cleared from excavation and stockpile areas was chipped and reused on-site to create berms for stormwater containment at three locations along the site perimeter.
- Metal tanks, structures and piping were cleaned and sent to an off-site metal recycling facility.
- 380 railroad ties (not PCB-contaminated) were removed from a former on-site railroad siding and sent to an off-site landscape supply facility.

EFFECTIVE DUST SUPPRESSION AND EROSION CONTROL

Although the RA disturbed a large part of the site's ground surface and involved considerable soil handling activities, dust suppression measures were highly successful in minimizing airborne dust migration off-site. These measures included applying water to the soil during excavation and mechanical screening, watering roadways, limiting truck traffic to improved roadways on-site and washing tires of loaded trucks prior to leaving the site.

Minimizing site erosion during the RA was an important objective, because the site is upgradient from surface waters designated critical habitat for several threatened anadromous fish. Although the RA was conducted during the typically dry weather period, contingency measures for erosion control were taken. Soil stockpiles were placed on plastic sheets, surrounded by a perimeter soil berm to contain any rainfall. Silt fences were placed in strategic locations to protect three small on-site wetlands and to prevent runoff from disturbed areas flowing off-site. Periodic inspections of the silt fences and the adjacent off-site drainage ditches were performed. Significant rainfall during the final weeks of the RA identified the need for additional protective measures; therefore, wood chip berms were placed in the northwest, southwest and northeast corners of the site to filter and slow the movement of rainfall leaving the site in these locations.

SCHEDULE

The RA was completed in just over four months. Completion of both segments 1 and 2 of the RA within this time period was the result of combined efforts of the contractor, subcontractors and EPA project team. Wet weather during the final weeks of the RA resulted in taking further erosion control measures, but did not materially affect the RA completion schedule.

Major RA milestones were as follows:

- June 2001 EPA approved the final RA design.
- June 14, 2001 EPA issued Statement of Work to URS
- July 23, 2001 URS awarded subcontract to Remtech
- July 31, 2001 URS and Remtech held a pre-construction meeting.
- August 1, 2001 RA field activities commenced.
- November 30, 2001 URS demobilized from the site.
- December 7, 2001 Remtech completed the RA and demobilized.
- April 23, 2002 Final RA Report submitted to EPA.

Excavator loading soil onto vibrating screen.

Buried coal tar chunks and drums.

Buried perforated structure removed from EA 2.

Buried process piping removed from EA 3.

Excavated soils placed in stockpiles along the margin of the excavation, awaiting confirmation sample analytical data to determine soil disposition.

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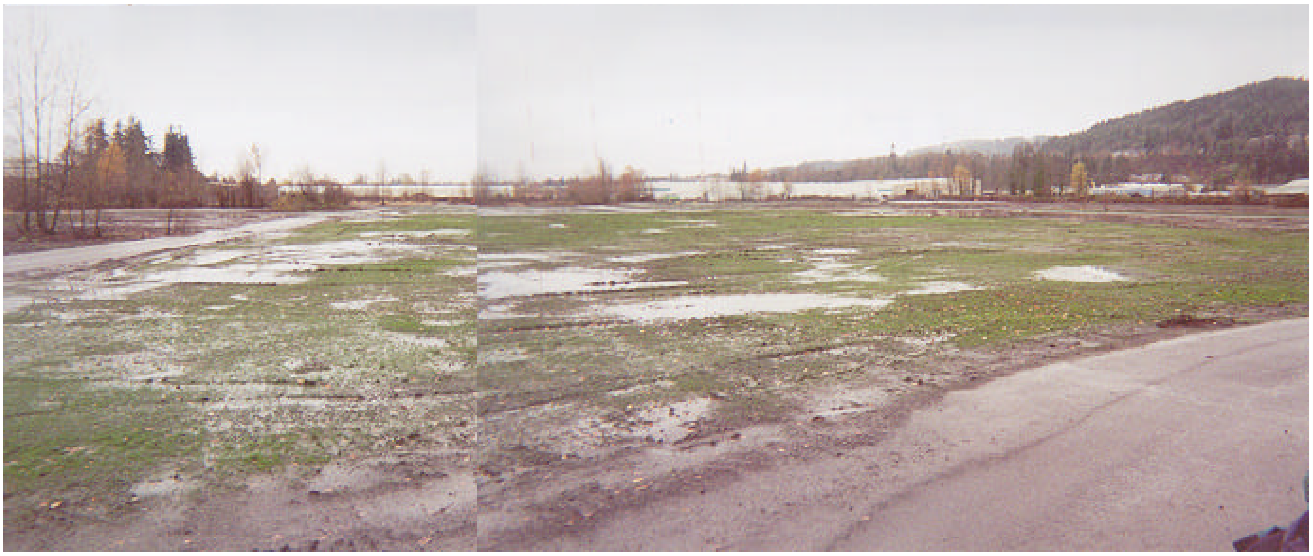
Backfilling EA 2 with thermally treated soil.



EA 2 backfilled and hydroseeded.